Result Page

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PROCESS ALLOWING TO DECORATE IN LARGE RATE WITH THE CONTAINERS
WITH CYLINDRICAL WALL TECHNICAL FIELD the invention relates to a process making it possible to decorate the cylindrical walls with containers, for example the cylindrical skirts of the flexible tubes before those are not filled of the product which it are intended to distribute. It particularly relates to decoration with hot marking or hot film transfers plating. Any type of cylindrical wall is considered: metallic, typically out of aluminium alloy, copper asbestos or entirely plastic, mono-or multilayer.

STATE OF TECHNICAL At the present time, the hot marking is applied on skirts of tube substantially to carry out decorations giving of the glossy effects similar with those given by noble metals, such as gold or the silver. Until the present invention of such decorations, enough expensive to realize, were reserved with the tubes containing of the products with high added value, typically of the cosmetic products.

The problem that proposes to solve the invention relates to the decoration of the skirt of the flexible tube when this one can be decorated only after to have been shaper of cylinder. It is from the start the case of the aluminium alloy tubes. It is also systematically the case for the tubes entirely out of plastic material whose skirt is obtained by extrusion, called " plastic tubes ". That can also occur for the called tubes entirely out of plastic material " laminated tubes " or for the copper asbestos tubes.

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The flexible tubes out of plastic material said " laminated " include/understand a head and a flexible skirt, obtained starting from a said tape " lamin, ee ", including/understanding several plastic layers in general. The skirt is obtained by cutting in a cylindrical sleeve, itself obtained by rolling of a planar tape. Rolling is carried out so that the tape is shaper of cylinder, the edges of the aforesaid the tape being put in, glance one of other, in general with a slight covering, then welded between them. The cylinder thus formed is cut out with. the desired tohguêûr to produce your skirt then a head de' tube is welded at an end of the aforesaid the skirt.

The said flexible tubes “plastic” are obtained either entirely by moulding (typically by injection), or, as in the case of the laminated ones, by welding of a head on a cylindrical skirt, the skirt cylindrique' aydnt obtained by extrusion of a cylindrical thin plastic material section then cutting of this one with the desired length.

In, you case of the copper asbestos tubes, or said tubes " laminated ", one can carry out it, hot marking on the tape front her shaper of cylinder with as of technical known of impression on flat strips such as that described in the request FR 2.171.170 (MADAG), where the tape is marked by a Member of impression comprising a mounted swing arm on pivot which compresses your bandaged which défitê into remaining resting against a roller or that described in US 5.368.680 (KURZ), where larger rates can be obtained while making pass the tape to be marked and the film transfer in the air-gap ranging between a cylinder marker and at least a cylinder of support.

But the " laminated " tubes are not very desired when it is a question of making decorations presenting of the glossy effects gold or silver, whose impression is done properly only by film transfer. Indeed, they present, from their shaper, a very visible longitudinal welding, which disturbs the aesthetic aspect

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tube. Gold, we saw it, this type of decoration accompany in general by the products with high added value, such as the cosmetic products and cohabit hardly with. a longitudinal welding considered as being unaesthetic. This is why one seeks to carry out the impression of such decorations on cylindrical surfaces without apparent longitudinal welding.

The hot transfer on nonplanar objects such as the cylindrical skirts of flexible tubes is carried out until present in recovery because the devices used cannot function in rates compatible with the other devices of the cycle manufacture. These devices comprise a planar tool having with each cycle an alternate movement of advance-retreat, typically a said advance “with step of pilgrim”. Such an alternate movement slows down the rates of manufacture, so that same the most powerful machines do not exceed 60 tubes/minute. Such an operation thus imposes is a reduction in the rate on the complete line of manufacture (in this case, this one hardly exceeds 60 tubes/minute whereas the other elements of the production line can reach 120 tubes/minute easily), either the realization on two parallel chains or more of the hot marking using the existing devices, or still the extended one of the production lines for a treatment in recovery (désenchaînement).

None of these solutions is satisfying, first and third for reasons economic obvious, second because it imposes high capital costs (multiplying of the machines, complexity of the chain of transfer since the tubes should be distributed to be treated then possibly to join together them after treatment), also because it imposes times of change of tooling high and that because of the multiplicity of the used tools, it leads to a reduced capability of the process: the industrial installation implementing the process has, because of multiplicity of the machines functioning into parallel, a less large ability to carry

out parts in the attached interval of tolerance by the schedule of conditions, which increases the rate of the rejects.

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The US patent 6.531.018 described a process to decorate in very large series the cylindrical walls with bouteill, esw, In this process, one makes freely ravel Jesdites cylindrical walls in front of a complex head of pressure provided with rollers of rotary transfer around a movable axis. This solution, which is certainly so adapt with manufacture in very large series, imposes high capital costs also.

The applicant is thus given for objective to carry out on line a hot marking of decorations on cylindrical objects by respecting a rate of production compatible with the line of production, i.e. capable to treat at least 100 tubes with the minute, and preferably at least 120 tubes at the minute.

DESCRIPTION OF the INVENTION a first object of the invention is a process to decorate the cylindrical wall with containers characterized in that it comprises at least the following steps: a) one uses mounted movable mandrels on a circuit in loop, each mandrel having a slightly low diameter with the diameter of the cylindrical wall of the container and being mounted on a support capable to move so that the axis of the mandrel remains parallel with a given direction D, the mounting of the mandrel on his support being carried out so that it can turn around its axis all into resistant with an effort exerted perpendicularly to that the axis; b) each container is brought successively to straight of a mandrel then fixed on the aforementioned mandrel; c) one brings the mandrel thus covered of the aforesaid container in the vicinity of a cylinder of pressure which can turn around an axis parallel to the aforementioned direction D;

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d) pendent its displacement in direction of the aforesaid cylinder of pressure, the aforementioned mandrel is put in rotation around its axis; e) one makes ravel. a-tape-support of. film transfer in the air-gap ranging between the cylinder of pressure and the mandrel covered of the aforesaid container; f) the mandrel and the cylinder of pressure are brought to the contact one of other, the cylindrical wall of the container and the surface of the cylinder of pressure being animated a substantially equal tangential speed, the aforementioned contact resulting in an effort exerted by the cylinder of pressure on the mandrel through the transferable film carrier strip and the wall of the container; g) one moves away then the carrier strip from the surface of the container, so that the portion of the film remaining transfer stuck to the wall of the container is detached of the aforesaid the carrier strip, thus materializing the decoration; h) one moves away then the mandrel unit and container from the cylinder of pressure to leave the place to the following mandrel; the aforementioned process being characterized in that:
A) the aforementioned cylinder of pressure is animated, for example using a motor, typically an electric motor, of a continuous rotational movement around the said axis, the aforementioned axis being fixed;
B) the mandrel is put in rotation at a speed correlated with that of the cylinder of pressure so that when the mandrel arrives at straight of the cylinder of pressure, the tangential speed of the cylindrical wall of the container in rotation is substantially equal at the tangential speed of the surface of the cylinder of pressure;
C) one makes ravel the film transfer carrier strip in the air-gap ranging between the cylinder of pressure and the mandrel covered of the aforesaid container so that it moves at a substantially equal linear speed at the tangential speeds of those.

To decorate the cylindrical wall with containers, one uses mounted movable mandrels on a circuit in loop, for example mounted on a rotary plate. These movable mandrels are of limited number, typically a few tens.

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mounting of the mandrel on its movable support must make it possible this one on the one hand to turn around its axis, on the other hand to resist an effort exerted perpendicularly to that the axis. For example a rolling bearing is used.

Preferably, the mandrel is mounted on its movable support so that it can also move along its axis. This way, a certain correction can be carried out, if required, on the longitudinal positioning of the container, i.e. on the longitudinal positioning of the already printed decoration on its wall.

The rotary plate turns preferably to the step by step, the mandrel being with each stop with straight of a zone of handling or treatment of the container, for example: hafting of the aforesaid container by its cylindrical wall around a mandrel, deposit or marking of a decoration on the cylindrical wall, unloading of the container provided with its decoration, etc... (of other stations can be used for various finishings of the container). For example, in the case of a flexible tube, one can envisage a station allowing the resulting removal of sprue of the moulding of the head of tube, the demounting of a closure membrane to seal the dispensing port, the automatic screwing of a plug, or fixing, by depression then click-and-ratchet work on the neck, of a capsule with hinge, etc...

The containers are brought successively to straight of a mandrel, typically using mounted barbs on a chain transfer, then fixed on the mandrels over a suitable length with the decoration to print. For example, when they are flexible tubes, the hafting is carried out preferably until the inner one of the head of tube arrives in abutment on the head of the mandrel, which makes it possible to have an axial indexing of the decoration on the skirt of tube. To improve the precision on axial positioning of the decoration, the mandrel can in addition be actuated by a device of axial translation.

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The cylinder of pressure is animated of a rotational movement continuous, preferably constant, around its fixed axis which is parallel with the direction of the axis of the mandrel. Preferably, the mandrel is brought to contact-of the cylinder of pressure so that it exerts an effort distributed as regularly as possible on a generator of this one. The aforementioned effort distributed is used either to deposit the decoration using the film transfer (transfer), or to mark the aforementioned decoration, surface of the aforesaid cylinder of pressure being etched (for example marking, hot or cold, or shaper of a decoration in relief by plastic deformation of the wall of the container). Moreover, the controlled tangential arrival of the mandrel in the vicinity of the cylinder of pressure allows the support of the mandrel, designed to make turn the aforementioned mandrel, not to undergo a too violent shock.

One animates the mandrel covered of the aforesaid container of a rotational movement so that when the mandrel arrives

at straight of the cylinder of pressure, the tangential speed of the cylindrical wall of the container in rotation is substantially equal at the tangential speed of the surface of the cylinder of pressure, typically equal with a margin of 1%, preferably equal with a margin of 0, 5%.

The mandrel is put in rotation for example by a servo-motor which authorizes large accelerations in rotation, thus making it possible to pass from a null tangential speed at an equal tangential speed to that of the surface of the cylinder of pressure at the end of a low lapse of time to that which corresponds to the displacement of the container between the preceding step of the process (for example the hafting of the container on the mandrel) and the step of deposit or marking of the decoration.

In a first modality of the invention, the aforementioned cylinder of pressure is a cylinder of marking: it present an etched surface according to the desired decoration.

Applied effort by the portions in relief of surface. etched the compression of a portion of the film transfer involves which is thinned and adheres on the wall of the cylindrical container. When one moves away the carrier strip from surface from

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container, the marked portion of the film transfer which remains stuck to the wall of the container detaches of the aforesaid the carrier strip, thus materializing the decoration to be realized.

The cylinder of marking is in general a rotary cylindrical massive block around its axis. Il can however take other forms, provided that etched surface is based on a cylindrical surface and turns around the axis of the aforesaid cylindrical surface. Typically, the marking is done hot with a cylinder of marking heating coming to mark a thermal film transfer: under the effect of the temperature and pressure, the plastic material of the marked zone of the film transfer acquires adhesive properties and is thinned, the border between the marked portion and the nonmarked portion becoming, after cooling, a zone with easy tearing.

To facilitate the detachment of the marked zone hot, one after maintains the carrier strip on the cylindrical wall of the pendent container a certain time his extended from the zone of marking. This time is sufficient to allow the cooling of the carrier strip and the film marked transfer until a temperature facilitating the detachment of the aforesaid film by cutting along the border between the marked zone and the nonmarked zone.

The cylinder of marking turns around its axis, preferably with a speed continuous and constant, which facilitates the servo-control of the carrying in rotation of the mandrel.

The carrier strip provided with the film transfer can also ravel at a constant speed, substantially equal with a margin of 1%, preferably with a margin of 0,5%, at the common tangential speed of the etched surface of the cylinder of marking and the wall of the container. To limit the losses due to the portions of film transfer not used, one can plan in advance a system of the tape allowing to slow down then to accelerate the aforementioned carrier strip in the interval of

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time separating the departure from a mandrel provided with a marked container to the arrival with a new mandrel provided with a not yet marked container. That it is at constant speed or not, will go carrier strip ravels while passing in the zone of marking, i.e. in the air-gap ranging between the cylinder of marking and the mandrel, so that it is trapped then compressed at the time of the mutual bringing together of the mandrel and the etched surface of the cylinder of marking. It ravels between a supply spool and a receiving coil, passing by a succession of rollers whose distribution allows, while exploiting the tension of the tape, to stabilize her run. Obviously, any film especially transfer-which can give an other effect than that of glossy metallic-can be used.

The mandrel is brought in contact with the cylinder of marking so that the cylindrical wall of the body present tangentially on the etched surface of the cylinder of marking and that this last exerts an effort on the aforementioned mandrel through the film transfer carrier strip and the wall of the container, the whole being animated of a tangential same speed.

One can for example bring the mandrel in rotation in the zone of marking, then, as soon as the tangential linear speed of the wall of the container corresponds at the tangential speed of etched surface, one moves the cylinder axis of marking in direction of the axis of the mandrel until the carrier strip, ravelling with the tangential same speed, is trapped then compressed by this movement. This way, the contact can be established gradually on a generator of the wall of the container. But, preferably, to simplify kinematic cylinder of marking and to decrease dead times, one keeps fixed the axis of rotation of the cylinder of marking and the mandrel is put in rotation before it does not arrive in the vicinity of the cylinder of marking, by making so that it can reach suitable speed front to reach the aforementioned zone of marking. The position of the cylinder axis of marking is defined compared to the trajectory of

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mandrels so that when they arrive at the contact one of other, an effort is applied on the generator of contact, sufficiently low so that the mandrel can mechanically resist and sufficiently substantial so that the film transfer is marked by the reliefs of the etched surface of the cylinder.

To always simplify kinematic device of marking, one uses mandrels preferably having, at least with straight wall of the container intended to be marked, a cylindrical wall with circular straight section. The wall of the container is not necessarily cylindrical with circular section but it must be sufficiently flexible to be able to marry the circular cylindrical form of this portion of the mandrel when the container is fixed and maintained on the aforementioned mandrel. For example, in the case of flexible tubes elliptical, the zone of marking of the skirt is located at a sufficiently large distance (corresponding typically with the ray of the circular cylindrical portion of the mandrel) from the head of distribution because the peripheral edge of the shoulder-more rigid-is not axisymmetric.

When the marking is carried out hot with a film giving transfer for example a glossy aspect (gold, silver) on a cylindrical skirt of flexible polyethylene low-density tube and thickness ranging between 250 and 600 micra, preferably adjacent of 400 micra, the effort of support lies between 2 N/mm and 40 N/mm while the etched surface of the cylinder of marking is

brought up to a temperature ranging between 80 C and 250 C.

Once the marking hot carried out, the tape-support remains resting against the mandrel on a given angular aperture, sufficiently large (at least 20, preferably at least 30) to allow the carrier strip and to the film marked transfer to move away from the block heating and to cool until a temperature facilitating the detachment of film by cutting along the border between the marked zone and the nonmarked zone but the angular aperture is limited because of the obstruction, since it cannot cross

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the trajectory of the mounted containers on the movable mandrels. Typically, one maintains your tape-support leaned on the cylindrical wall of the container, until this one reaches a low average fempérature at 80 C, preferably low at 60 C
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So that tq tape-support remains you ptus a long time possible resting against you mandrel, i.e. to increase the pfus possibte this angte of opening, been able - one can asservirla it, die Po. T, in néi NT in aa die ".

, ; the carrier strip of tefje kind: that moment of the m your tension of: , your tape is your ptus rqibte possibtë with your extended die you air-gap of the device of
P. p P mérqUagë. 'one also can, pendent the marguage, to make move a driving mechanism. of the tape de' kind who it enters the trajectory of the mandrins' mais' that it allows of. to plate la' carrier strip on a pius large angular aperture, typiquernéeit upper with 30, preferably upper to 45. As soon as you decoration is deposited on your wall of the container Jedit driving mechanism is, given. with a position such as le' mandrel can, to move without entering in coitision with him.

Another possible solution to hot facilitate the detachment of a marked decoration, cumulable solution with one or the other one of preceding, consists in sweeping the carrier strip of a cold airflow to extended of the air-gap of hot marking.

One thus moves away the carrier strip from the surface of the container, so that the marked portion of the film remaining transfer stuck to the wall of the container is detached of the aforesaid the carrier strip, thus materializing the decoration. The mandrel which can carry out a turn on itself with the etched surface of the cylinder of marking in continuous support, the decoration can be produced on the totality of the circumference of the wall of the container.

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This decoration can be of axial symmetry but it is possible to carry out the decoration with a position wanted on the cylindrical wall of the container: after hafting - container on the immovable mandrel, one makes turn the mandrel and one carries out an optical determination of an index prémarqué on container-by example during the offset printing of a decoration without glossy effect gold or silver on the container and one calculates the rotation of the mandrel so that you container arrives in contact with surfaced cylinder while being presented according to a predefined angular position. The device proposed in you free, hereafter includes/understands equipment which makes it possible to carry out a téiie angular indexing.

In general; the index of positioning of the decoration is pre-printed in a not very visible place, i.e. further possible from the place more exposed decoration, namely the portion of the decoration conceived to be seen in first par. the consumer (particular aesthetic aspect, mark, slogan, Or the inaccuracy of the pre-impression cumulated with that of the marking can give; , in spite of. use of the device quoted optical location higher, of the shifts capable to degrade, the desired visual aspect for this strategic portion of the decoration. To avoid that, the device of evoked optical location higher is preferably supplemented by a second optical device, typically a camerq, video, retié with a corrective computational system which, using one, software of analysis of image, makes it possible to readjust finely the position of the mandrel at the same time arigulsirement (change of the evoked angular correction higher) and axially (correction using a device of axial translation actuating either the mandrel or the cylinder of marking).

The process according to the invention can also extend to the formation from a decoration in relief on the cylindrical wall from containers. In such a case, it is not required to make ravel a film transfer carrier strip since etched surface comes to be inserted directly in the cylindrical wall.

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angular principle of indexing evoked in the preceding paragraph can be also applied.

The process according to the invention can also extend to decoration from the cylindrical wall from a container where the decoration would be pre-printed using an ink or of a varnish which would retain or on the contrary the film transfer coming would push back to be plated uniformly on the cylindrical wall of the container under the effect of the support of a nonetched cylinder.

Another object of the invention is a device making it possible to implement the process above applied the decoration of cylindrical body, typically the cylindrical skirts of flexible tubes characterized in that it is about a machine including/understanding a fixed plate placed at the glance of a rotary plate functioning with the step by step, the aforementioned rotary plate being provided with mandrels being able to turn around their axis, the aforementioned axis being parallel with the axis of rotation of the plate, the aforementioned mandrels being brought successively during the rotation of the plate in several working areas spared on the fixed plate, these working areas including/understanding at least: a) a zone of food where the cylindrical bodies are brought taking into consideration a mandrel then fixed around the said mandrel; b) a zone of marking including/understanding: - at least a cylinder of marking in continuous rotation, preferably with a number of constant revolutions, whose axis is placed in a place such as when a mandrel arrives at straight the of the aforesaid cylinder, this one comes into contact the aforementioned mandrel by exerting an effort of support, preferably distributed on a generator; - mandrels being driven by means of carrying in rotation, typically of the servo-motors, allowing to pass from a null tangential speed at an equal tangential speed to that of the cylinder of marking at the end of a low lapse of time to that which corresponds to the displacement of the container of a working area to the following one;

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c) a zone of evacuation of the cylindrical bodies.

The-zone of marking can include/understand more than one cylinder of marking what makes it possible to increase the rates of production by simultaneous treatment several containers. This requires nevertheless an installation of the plate and other working areas since the containers must be moved everywhere and treaties simultaneously in group.

For the marking using a film transfer, this device is preferably supplemented in the zone of marking by a device of run of a film transfer tape-support, making ravel the tape so that it crosses the space ranging between the aforementioned cylinder of marking and the surface of the cylindrical body when a mandrel is brought in this working area, the aforementioned device being provided with systems making it possible to control the tension of the tape, especially with extended of the air-gap of the device of marking. To mark hot using a thermal film transfer, the cylinder of marking is preferably heating.

When the aforementioned cylindrical bodies are flexible tubes, the new device can preferably result from the installation of an existing, called device bouchonneuse, in which one can find: - the aforementioned zone of power supply of the flexible tubes and hafting of the cylindrical skirts of the aforesaid flexible tubes around the mandrel; - one zone-optional-of décarottage of the head of tube, for example when it was obtained by mould on an end of skirt in a preceding step of the process; décarottage resulting in the realization of the dispensing port; - one zone-optional-of installation of closure membrane on the dispensing port; - one zone-optional-of bouchonnage, where, typically, the plugs are brought individually to straight of a tube, put in rotation then screwed on the threaded neck of the head (case of the plugs to be screwed) or depressed then

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retained on the aforementioned neck (rigid cases of capsules provided with pivotable covers (capsule-services)).

- zone-optional, recommended when one wants to carry out a decoration index-with location of a spot representative of the already printed decoration, the aforementioned zone being preferably directly upstream zone of marking; this zone can also be equipped with a complementary device, typically a video camera, connected to a corrective computational system which, using a software of analysis of image, makes it possible to readjust finely the position of the mandrel at the same time angularly and axially; - the aforementioned zone of marking; - one zone-optional-of control (typically using a video camera), decorations obtained (positioning, quality of the transfer, detachment, carrying in relief,...) - the aforementioned zone of evacuation of the flexible tubes.

To place with precision a marked decoration (or a decoration in relief) on an already printed decoration, one can proceed in the following way: One provides the workstation located directly upstream with that of the hot marking of an optical system of location allowing to detect using a photoelectric cell the angular position of a spot materializing a known particular point of the already printed decoration. The mandrels are provided with means of drive, which make it possible to actuate them in rotation while making ravel a belt. Typically the drive belt is notched and involves a notched wheel integral of the axis of rotation of the aforesaid mandrel.

One makes pass the aforementioned belt notched to the station of marking (station N) and to the station directly upstream (station (n-1)), so that the mandrels remain in constant contact with the aforementioned belt of the beginning of the step of location (station (n-1) with fine of the step of marking (station N).

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displacement of the aforesaid the belt is controlled by only one servo-motor. Like, by construction, the two mandrels placed in these workstations turn in a synchronized way. and that the mandrel at the station of marking is in phase with the rotation of the cylinder of marking it number of revolutions of the mandrel is defined so that the cylindrical surface of the body and the etched surface of the cylinder of marking have the tangential same speed, it is enough to detect the angular position of the index pre-printed on the body placed on the mandrel located at the station (n-1) to know the angular shift compared to the mandrel in the course of marking and consequently compared to the etched surface of the cylinder of marking. Using a suitable algorithm, the automatism calculates the correction required to bring the body in good position and at the good speed to station N of marking. This correction is carried out pendent the displacement of the mandrel of the station (n-1) towards station (N).

The use of a common drive belt on these two stations, the aforementioned belt itself being pulled by a single servo-motor, makes it possible to improve the precision by avoiding any resulting play of recovery of a change of motor or belt.

Obviously, the same bouchonneuse one can. to be used for to carry out decorations in relief: one removes the tape-support of film of transfer and the driving mechanism of the aforesaid the tape.

Another object of the invention is a process to decorate the cylindrical walls with containers in which, instead of marking the zones defining the decoration, one prints them with a varnish or a said ink " in love " i.e. an ink including/understanding an agent promoter with adhesion supporting the adhesion of the film transfer on the printed decoration, typically a varnish or an ink including/understanding of the organic particles (for example acrylic.) under polymerized. The cylinder is then a single cylinder of support exerting a pressure on the wall of the container so that the portion of the film transfer adhering on the printed portion of the wall is detached from the carrier strip

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when this one is far away from the wall of the container. The process includes/understands the following steps thus: a) one uses movable mandrels (12, 13) mounted on a-circuit. in boucie, each mandrel having a slightly low diameter with the diameter of the cylindrical wall of the container and being mounted on a support capable to move so that the axis of the mandrel remains parallel with a given direction, the mounting of the mandrel on its support being carried out manner so that it can turn around its axis all into resistant with an effort exerted perpendicularly to that the axis; b) each container is brought successively to straight of a mandrel then fixed on the aforementioned mandrel; c) the cylindrical wall of each container is printed according to the decoration desired with an ink or a varnish supporting the adhesion of a film transfer; d) one brings the mandrel thus covered of the aforesaid container in the vicinity of a cylinder of pressure, the aforementioned cylinder being animated of a movement. of rotation around its axis; e) pendent its displacement in

direction of the aforesaid cylinder of pressure, the aforementioned mandrel is put in rotation at a speed correlated with that of the cylinder of pressure so that when the mandrel arrives at straight of the cylinder of pressure, the tangential speed of the wall of the container in rotation is substantially equal at the tangential speed of the surface of the cylinder of pressure; f) one makes ravel a film transfer carrier strip in the air-gap ranging between the cylinder of pressure and the mandrel covered of the aforesaid container, so that when it arrives in the aforementioned air-gap, it moves at a substantially equal linear speed at the circumferential speeds of those; g) the mandrel and the cylinder of pressure are brought to the contact one of other, the aforementioned contact resulting in an effort exerted by the cylinder of pressure on the mandrel through the film transfer carrier strip and the cylindrical wall of the container, the aforementioned effort involving the compression of film

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transfer, resulting in an adhesion of a portion of the aforesaid film transfer on the printed portion of the wall of the cylindrical container; h) one moves away then the carrier strip already surface from the container, so that the portion of the film remaining transfer stuck to the wall of the container is detached of the aforesaid the carrier strip, thus materializing the decoration; i) when the totality of the decoration is marked, one moves away the mandrel unit and container from the cylinder to leave the place to the following mandrel (12).

Lastly, another object of the invention is an adjacent process of the preceding one, in which the cylindrical wall of each container is on the contrary printed according to the decoration desired with an ink or a varnish including/understanding an inhibiting agent of adhesion, i.e. an ink or a varnish preventing the adhesion of the aforesaid film transfer on the printed decoration, typically an ink or a varnish including/understanding of the particles containing silicones and/or waxes. When the mandrel and the cylinder of pressure are brought to the contact one of the other one, the contact results in an effort exerted by the cylinder of pressure on the mandrel through the film transfer carrier strip and the cylindrical wall of the container. The effort involves the compression of the film transfer and results in the adhesion of a portion of the aforesaid film transfer on the nonprinted portion of the cylindrical wall of the container. Preferably, the aforementioned film transfer has adhesive properties such as for example a hot melt. Preferably still, a cylinder of pressure will be used heating so that at the time of the support of the cylinder of pressure on the sleeve through the film transfer, this last acquires the aforementioned adhesive properties and adheres thus heavily on the nonprinted portion of the cylindrical wall of the container.

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Obviously, a device with rotary plate such as that described previously can be used for to carry out of such decorations: one envisages a print station of the skirt of tube upstream of the station of plating of the cylinder of support against the wall of the tube through the tape-support of the film transfer.

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That ink contains an agent promoter or on the contrary inhibiting of adhesion, the impression can be carried out using a conventional device. typically a machine offset placed on the production line upstream of the aforesaid device with rotary plate. One can also plan to carry out the impression by arranging a station of impression in the device with rotary plate itself, upstream of the station where the film transfer is plated
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on the wall of the container. The impression can for example be carried out by flexôgraphië with the assistance: of an etched cylmdrë., the indexing ang' ûlaire clu decoration to be printed can be réqtisée with you helps. process describes higher, with your difference
P. P, P P close you print roll takes your ptacé of the cytindrë of marking.

FIGURES figure 1 schematically illustrates a device of hot marking of cylindrical bodies of the art antérieur', figure 2 illustrates a device schematically of. hot marking of cylindrical bodies according to the invention.

Figure 3 illustrates an enlarged detail of the figure 2a, representing particularly the vicinity of the zone of hot marking.

Dispositif EXAMPLES of the former art (Figure 1) This device comprises a cylinder of marking 1 having a planar etched surface 2. The block of marking is heating and makes it possible to mark hot using a thermal film transfer. Il moves tangentially with the wall of container 3. Once the totality of the cylindrical wall is marked, it is far away from carrier strip 4 of film transferable hot and brought back in

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upstream to carry out a new passage over a new container. It thus carries out with each cycle an alternate movement of advance-retreat, of type not of., pilgrim. Such an alternate movement slows down the rates of manufacture, so that same the most powerful machines do not exceed 60 tubes/Dispositif minute according to the invention (Figures 2 and 3) the device illustrated schematically by figures 2 and 3 corresponds to a station of a called machine " bouchonneuse " which carries out with the procession and in large rate a certain number of operations of finishing on flexible tubes. This machine includes/understands a fixed plate placed at the glance of a rotary plate functioning with the step by step. The movement of the plate is symbolized on figure 2 by referred arrow R. The rotary plate is provided with mandrels, such as the referred mandrels 12 and 13. These mandrels are mounted on the rotary plate so that their axis remains parallel with the axis of rotation of the plate and that they can turn around their axis. They are moreover guided so that it can carry out a translatory movement axial of low amplitude (about the millimeter). The aforementioned mandrels follow a circular trajectory 20 and are brought successively during the rotation of the plate in several working areas spared on the fixed plate: - a first zone of supply of the flexible tubes and hafting of the aforesaid tubes around the mandrel (not represented) - a zone of décarottage of the head of tube (not represented) - a zone of bouchonnage per screwing of a plug on the neck threaded of the aforesaid tube (not represented) - a zone of hot marking 10 including/understanding: - a cylinder of marking 11 in continuous rotation R'.

- a device 30 of run of a carrier strip 14 of transferable film hot, bringing the aforementioned tape in the air-gap of the device of marking; the aforementioned device being provided with a system of rollers 31 of which the provision and

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the speed of drive controlled make it possible to control the tension of the carrier strip 14 with extended of the air-gap of the device of marking - a zone of evacuation of the flexible tubes thus decorated (not represented) Between each step, the plate carries out a rotation R corresponding with an angle of 2n/n, N being the number of stations envisaged on the machine (typically n= 12). During this rotation of the plate, mandrel 12, intended for arrived at the station of marking (where it is indicated by reference 13), is put in rotation around its axis thanks to the displacement of a notched drive belt 16 which involves a notched wheel 15 integral of the axis of rotation of the aforesaid mandrel.

The drive belt 16 itself is actuated by a servo-motor (not represented), which makes it possible to pass from a null tangential speed at an equal tangential speed to that of the cylinder of heating marking. This last turns at a speed such as the etched surface of the cylinder of marking 11 moves in a time given over an equal circumferential length with the perimeter of the skirt of tube. For example, if one aims a rate of 120 tubes/minute for a decoration at glossy effect silver covering totality of the periphery of the tube, it is necessary to aim at an operation of typically low duration to 0,2 S (0,3 S remaining being reserved with the rotation of 2n/n plate), which corresponds at a number of revolutions of about 5 tr/s. This speed must be reaching and controlled at the end of a low lapse of time to that which corresponds to the displacement of the container of a working area to the following one, i.e., by continuing our example, low to 0,3 S. One thus needs a capable servo-motor, via belt 16 and notched 15 coil it, to actuate the mandrel with clearly upper accelerations with 15 tr/s2.

One preferably chooses a servo-motor capable to generate accelerations in rotation of the mandrel ranging between 300 and 15000 tr/s2

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Once compression carried out, the tape-support remains resting against the mandrel on a given, sufficiently large angular aperture (at least 20, preferably at least 30) to allow the carrier strip and the film marked transfer to move away from the block heating and to cool until a temperature facilitating the detachment of film by cutting along the border between the marked zone and the nonmarked zone (duration of the holding in support of about 0,02 S). The angular aperture however is limited because of the obstruction, since it cannot cut the trajectory of the mounted containers on the movable mandrels to hot mark with precision a decoration on an already printed decoration, one proceeds in the following way: the workstation located directly upstream of that of the hot marking whose position is symbolized by mandrel 12 is provided with an optical system of location 40 making it possible to detect using a photoelectric cell the angular position of a spot materializing a known particular point of the already printed decoration. Mandrel 12 is provided with a notched wheel 15 integral of its axis of rotation, which makes it possible to actuate the aforementioned mandrel in rotation while making ravel the drive belt 16.

One makes pass the notched belt 16 to the station of marking (station N, whose position is symbolized by the mandrel 13) and to the station directly upstream (station (n-1), whose position is symbolized by mandrel 12), so that the mandrels are in constant contact with the aforementioned belt of the beginning of the step of location (station (n-1)) with fine of the step of marking (station N). The displacement of the aforesaid the belt is controlled by only one servo-motor. Like, by construction, two mandrels placed in these workstations turn of way synchronized, and that the number of revolutions of mandrel 13 is defined so that the cylindrical surface of the body and the etched surface of the cylinder of marking 11 have the tangential same speed, it is enough to detect using the optical device of location 40 the angular position of

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the index pre-printed on the body placed on mandrel 12 located at the station (n-1) to know the angular shift compared to the cylindrical body of mandrel 13 and consequently by report/ratio at it, surface etched-of the cylinder of marking. Using a suitable algorithm, the automatism calculates the correction required to bring the cylindrical body of mandrel 12 in good position and at the good speed to station N of marking. This correction is carried out pendent the displacement of mandrel 12 of station (N 1) towards station (N).

The optical device of location 40 is preferably supplemented by a video camera (not represented) connected to a computational system which, using a software of analysis of image, makes it possible to readjust automatically the position of the mandrel at the same time angularly (change of the angular correction evoked in the preceding paragraph) and axially (correction using a device of axial translation actuating the mandrel when celuici is still at the station (n-1)).

ADVANTAGES O the hot compression of the tubular wall causes also beneficial dimensionally to stabilize the cylindrical wall of the body, in particular when this one is out of plastic material.